QUESTIONING THE PEST AND QUARANTINE STATUS OF THE MANGO SEED WEEVIL IN HAWAII

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The export of mangoes from Hawaii is prevented by the presence of the mango seed weevil (MSW), *Cryptorhynchus mangiferae*. Adult females oviposit on the surface of young fruit and the first instars burrow through the pulp to the developing seed where they feed and pupate. Larval development takes 20-30 d. The long-lived adult leaves the seed after the fruit falls to the ground and decays to find protected places to overseason. Infestation levels can reach 100% and can vary widely (0-100%) at sites in the same general area, suggesting dispersal is limited.

We question three widely held beliefs about MSW relative to its pest status (Pena et al. 1998): that MSW causes damage to the flesh of the fruit rendering it unmarketable, or at least unappetizing; that MSW infestation can cause premature fruit drop; and that MSW infestation reduces seed germination. (1) In Hawaii and Australia, larval development in the mango occurs entirely in the seed after the newborn larva burrows into the fruit. The path of the neonate through the fruit is indistinct when it first occurs, and later disappears altogther. Rarely larvae are found feeding on the pulp close to the seed. Therefore, in most cases MSW attack does not reduce fruit marketability. (2) The effect of MSW on fruit drop is poorly studied. We conducted a preliminary study where we collected small mangoes from the ground and from the tree and opened fruit to determine the presence/absence of MSW. Fruit on the ground did not have a higher incidence of MSW than fruit on the tree. More detailed studies are in progress. (3) It has been assumed that weevil-damaged seeds have lower germination and, therefore, that MSW may limit plant propagation in nurseries and orchards. We are conducting two studies to test this assumption. First, we have collected Haden (monoembryonic) and Common (polyembryonic) mangoes, determined whether they were MSW-infested or uninfested using x-ray, and planted them outdoors on pots to determine rates of germination. Data collection is not complete, but in both varieties, germination rates of infested and uninfested of both mango varieties do not appear to be different. Secondly, we artificially damaged seeds by cutting away 25, 50, or 75% of the seed, then planted them and observed rates of germination. We estimate that a mango seed weevil typically consumes less than 25% of the seed, so our damage treatments were greatly exaggerated. In all treatments the endosperm was the portion cut away, and the germ or embryo was left undamaged. Germinataion

in all the treatments was high, indicating that the mango seed can withstand substantial damage and still germinate successfully.

Researchers have attempted to kill mango seed weevil in mangoes using heat and cold treatments and fumigants without success. We have been reviewing the literature on MSW sensitivity to irradiation as an alternative. Seo et al. (1974) conducted a series of irradiation experiments in Hawaii with MSW that suggested an irradiation dose of 100 Gy is probably adequate to sterilize MSW and 300 Gy should prevent adult emergence. An Australian study confirmed the effectiveness of an irradiation dose of 300 Gy to prevent adult emergence (Heather & Corcoran 1992). We have a project in progress to confirm and extend the results of these irradiation studies.

References

Seo, S. T., R. M. Kobayashi, D. L. Chambers, L. F. Steiner, C. Y. L. Lee, & M Komura. 1974. Mango weevil: Cobalt-60 gamma irradiation of packaged mangoes. J. Econ. Entomol., 67: 504-505.

Heather, N. W. & R. J. Corcoran. 1992. Effects of ionizing energy on fruit flies and seed weevil in Australian mangoes. *In* Panel Proceedings of the Final Research Coordination Meeting on "Use of Irradiation as a Quarantine Treatment of Food and Agricultural Commodities", Kuala Lumpur, Malaysia, Aug 1990. IAEA, Vienna.

Pena, J. E., A. I. Mohyuddin, & M Wysoki. A review of the pest management situation in mango agroecosystems. Phytoparasitica 26: 129-148.